Rule CIC330: High percent shared TS queue index buffers were in use

Finding: The CICS Shared Temporary Storage Queue Server statistics showed that a high percent of shared temporary storage (TS) queue index buffers were in use.

Impact: This finding has a LOW IMPACT on the performance of the CICS region. It is provided as an "early warning" of a potential problem.

Logic flow: This is a basic finding, based on an analysis of the data. The finding applies only with CICS/Transaction Server for OS/390 or for z/OS.

Discussion: The shared temporary storage queue server uses a *queue index buffer pool* within its region, to read and write queue index entries. When a READQ TS or WRITEQ TS request completes, the queue index information is retained in the buffer. Retaining the queue index entries in the queue index buffer pool can avoid the need to reread the queue index entry if the same queue is referenced from the same MVS image before the buffer has been reused.

The queue index buffer pool holds recently accessed index entries in storage to reduce significantly the coupling facility I/O for queue items. It is much more efficient to reuse an entry in the queue index buffer pool than to request the information for the coupling facility.

The queue index buffer pool is used for data associated with queue index entries if the total queue size does not exceed 32K bytes (that is, the TS queue is a "small queue").

When a request for the same queue arrives, the shared TS queue server determines whether the queue index information is in the buffer. If the information is in the buffer, a coupling facility access is avoided. When the request completes, the shared TS queue server places the information into a buffer, onto a least recently used (LRU) chain. If all other buffers are in use, a request for a new buffer will discard the contents of the least recently used buffer and reuse the storage as a free buffer.

The number of buffers in the queue index buffer pool is defined using the BUFFERS= keyword in the TS queue server parameters. The default specification is BUFFERS={100}, which specifies that 100 buffers should

be allocated to the server address space. The maximum specification is 999999[1] buffers.

If a large percent of buffers were in use, it is possible that (1) an inadequate number of buffers were defined or (2) the application is not freeing buffers in a timely manner.

Shared temporary storage queue server buffer pool statistics available in MXG file CICXQ2. CPExpert uses data in CICXQ2 to calculate the percent of queue index buffer pool buffers that were used, using the following algorithm:

$$\textit{Percent queue index buffer pool buffers used} = \frac{S2BFENTH}{S2BFQTY}$$

where S2BFENTH = Maximum number of queue index buffer pool buffers used
S2BFQTY = Number of buffers defined for the queue index buffer pool

CPExpert produces Rule CIC330 when the percent queue index buffer pool buffers that were used is greater than the value specified by the **TSPCTFBP** guidance variable in USOURCE(CICGUIDE). The default value for the **TSPCTFBP** is 75, indicating that CPExpert should produce Rule CIC330 whenever more than 75% of the queue index buffer pool buffers were used.

This finding is produced as an "early warning" of a potential problem. If all buffers in the queue index buffer pool are used, the shared TS queue server begins to discard and reuse the oldest (least recently used) buffer. A large percent of LRU activity would be reported by **Rule CIC331**, and could imply "thrashing" in the queue index buffer pool.

Suggestion: If this finding is produced, you should consider the following alternatives:

- Increase the number of buffers specified for the queue index buffer pool. This action would particularly be appropriate if the finding shows an **increasing** percent of buffers used in the queue index buffer pool.

- Review applications using shared temporary storage to determine whether the applications are freeing temporary storage buffer pool buffers in a timely manner.

[1] IBM states that it is not worth defining extra buffers beyond the point where the definition might cause MVS paging, as it is more efficient to reread the index entry than to page in the buffer from auxiliary storage.

- Change the TSPCTFBP guidance variable in USOURCE(CICGUIDE) so Rule CIC330 is produced only when you wish to be aware of a larger percent of buffers used in the queue index buffer pool.

- You can specify **%LET TSPCTFBP = 100;** in USOURCE(CICGUIDE) to suppress this finding (the percent of buffers used in the queue index buffer pool cannot be greater than 100%), or you can "turn off" the rule using the process described in Section 3 of this User Manual.

Reference: *CICS/TS Release 1.1*
CICS System Definition Guide: Section 3.4.3.4: Primary parameters
CICS Performance Guide: Shared TS queue server: buffer pool statistics

CICS/TS Release 1.2
CICS System Definition Guide: Section 3.4.3.4: Primary parameters
CICS Performance Guide: Shared TS queue server: buffer pool statistics

CICS/TS Release 1.3
CICS System Definition Guide: Section 4.2.2.4: Primary parameters
CICS Performance Guide: Shared TS queue server: buffer pool statistics

CICS/TS for z/OS Release 2.1
CICS System Definition Guide: Chapter 21: Primary parameters
CICS Performance Guide: Shared TS queue server: buffer pool statistics

CICS/TS for z/OS Release 2.2
CICS System Definition Guide: Chapter 21: Primary parameters
CICS Performance Guide: Shared TS queue server: buffer pool statistics

